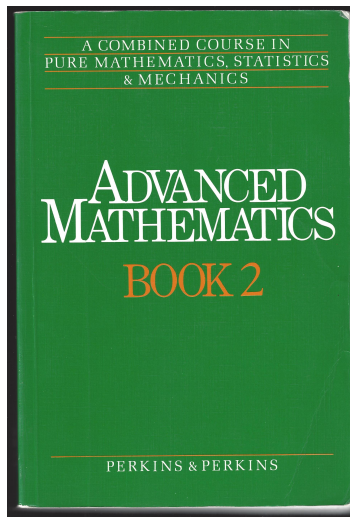


A Solution Manual For

**Advanced Mathematics, Book2,  
Perkin and Perkin, 1992**



**Nasser M. Abbasi**

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## 1.1 problem 1

Internal problem ID [2543]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 1.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$3y^2y' - 2x + 1 = 0$$

### ✓ Solution by Maple

Time used: 0.016 (sec). Leaf size: 78

```
dsolve(3*y(x)^2*diff(y(x),x)=2*x-1,y(x), singsol=all)
```

$$y(x) = (x^2 + c_1 - x)^{\frac{1}{3}}$$

$$y(x) = -\frac{(x^2 + c_1 - x)^{\frac{1}{3}}}{2} - \frac{i\sqrt{3}(x^2 + c_1 - x)^{\frac{1}{3}}}{2}$$

$$y(x) = -\frac{(x^2 + c_1 - x)^{\frac{1}{3}}}{2} + \frac{i\sqrt{3}(x^2 + c_1 - x)^{\frac{1}{3}}}{2}$$

### ✓ Solution by Mathematica

Time used: 0.215 (sec). Leaf size: 68

```
DSolve[3*y[x]^2*y'[x]==2*x-1,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \sqrt[3]{(x-1)x + 3c_1}$$

$$y(x) \rightarrow -\sqrt[3]{-1} \sqrt[3]{(x-1)x + 3c_1}$$

$$y(x) \rightarrow (-1)^{2/3} \sqrt[3]{(x-1)x + 3c_1}$$

## 1.2 problem 2

Internal problem ID [2544]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 2.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y' - 6xy^2 = 0$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 13

```
dsolve(diff(y(x),x)=6*x*y(x)^2,y(x), singsol=all)
```

$$y(x) = \frac{1}{-3x^2 + c_1}$$

### ✓ Solution by Mathematica

Time used: 0.108 (sec). Leaf size: 22

```
DSolve[y'[x]==6*x*y[x]^2,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow -\frac{1}{3x^2 + c_1}$$

$$y(x) \rightarrow 0$$

### 1.3 problem 3

Internal problem ID [2545]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 3.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y' - e^y \sin(x) = 0$$

#### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 13

```
dsolve(diff(y(x),x)=exp(y(x))*sin(x),y(x), singsol=all)
```

$$y(x) = -\ln(\cos(x) - c_1)$$

#### ✓ Solution by Mathematica

Time used: 0.285 (sec). Leaf size: 15

```
DSolve[y'[x]==Exp[y[x]]*Sin[x],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow -\log(\cos(x) - c_1)$$

## 1.4 problem 4

Internal problem ID [2546]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 4.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y' - e^{x-y} = 0$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 9

```
dsolve(diff(y(x),x)=exp(x-y(x)),y(x), singsol=all)
```

$$y(x) = \ln(e^x + c_1)$$

### ✓ Solution by Mathematica

Time used: 0.747 (sec). Leaf size: 12

```
DSolve[y'[x]==Exp[x-y[x]],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \log(e^x + c_1)$$

## 1.5 problem 5

Internal problem ID [2547]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 5.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y' - x \sec(y) = 0$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 12

```
dsolve(diff(y(x),x)=x*sec(y(x)),y(x), singsol=all)
```

$$y(x) = \arcsin\left(\frac{x^2}{2} + c_1\right)$$

### ✓ Solution by Mathematica

Time used: 0.414 (sec). Leaf size: 31

```
DSolve[y'[x]==x*Sec[y[x]],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \arcsin\left(\frac{x^2}{2} + c_1\right)$$

$$y(x) \rightarrow \arcsin\left(\frac{x^2}{2} + c_1\right)$$



## 1.6 problem 6

Internal problem ID [2548]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 6.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_quadrature]

$$y' - 3 \cos(y)^2 = 0$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 12

```
dsolve(diff(y(x),x)=3*cos(y(x))^2,y(x), singsol=all)
```

$$y(x) = \arctan(3x + 3c_1)$$

### ✓ Solution by Mathematica

Time used: 0.345 (sec). Leaf size: 32

```
DSolve[y'[x]==3*Cos[y[x]]^2,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \arctan(3x + 2c_1)$$

$$y(x) \rightarrow -\frac{\pi}{2}$$

$$y(x) \rightarrow \frac{\pi}{2}$$

## 1.7 problem 7

Internal problem ID [2549]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 7.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y'x - y = 0$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 7

```
dsolve(x*diff(y(x),x)=y(x),y(x), singsol=all)
```

$$y(x) = c_1x$$

### ✓ Solution by Mathematica

Time used: 0.02 (sec). Leaf size: 14

```
DSolve[x*y'[x]==y[x],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow c_1x$$

$$y(x) \rightarrow 0$$

## 1.8 problem 8

Internal problem ID [2550]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 8.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$(1 - x)y' - y = 0$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 11

```
dsolve((1-x)*diff(y(x),x)=y(x),y(x), singsol=all)
```

$$y(x) = \frac{c_1}{x - 1}$$

### ✓ Solution by Mathematica

Time used: 0.023 (sec). Leaf size: 20

```
DSolve[(1-x)*y'[x]==y[x],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \frac{c_1}{1 - x}$$

$$y(x) \rightarrow 0$$

## 1.9 problem 9

Internal problem ID [2551]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 9.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y' - \frac{4xy}{x^2 + 1} = 0$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 13

```
dsolve(diff(y(x),x)=(4*x*y(x))/(x^2+1),y(x), singsol=all)
```

$$y(x) = c_1(x^2 + 1)^2$$

### ✓ Solution by Mathematica

Time used: 0.025 (sec). Leaf size: 20

```
DSolve[y'[x]==(4*x*y[x])/(x^2+1),y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow c_1(x^2 + 1)^2$$

$$y(x) \rightarrow 0$$

## 1.10 problem 10

Internal problem ID [2552]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 10.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y' - \frac{2y}{x^2 - 1} = 0$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 18

```
dsolve(diff(y(x),x)=(2*y(x))/(x^2-1),y(x), singsol=all)
```

$$y(x) = \frac{c_1(-x^2 + 1)}{(x + 1)^2}$$

### ✓ Solution by Mathematica

Time used: 0.026 (sec). Leaf size: 22

```
DSolve[y'[x]==(2*y[x])/(x^2-1),y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow -\frac{c_1(x - 1)}{x + 1}$$

$$y(x) \rightarrow 0$$

## 1.11 problem 11

Internal problem ID [2553]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 11.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y'x^2 - y^2 = 0$$

With initial conditions

$$[y(1) = -1]$$

### ✓ Solution by Maple

Time used: 0.032 (sec). Leaf size: 14

```
dsolve([x^2*diff(y(x),x)-y(x)^2=0,y(1) = -1],y(x), singsol=all)
```

$$y(x) = -\frac{x}{-1 + 2x}$$

### ✓ Solution by Mathematica

Time used: 0.109 (sec). Leaf size: 14

```
DSolve[{x^2*y'[x]-y[x]^2==0,y[1]==-1},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \frac{x}{1 - 2x}$$

## 1.12 problem 12

Internal problem ID [2554]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 12.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y' + 2yx = 0$$

With initial conditions

$$[y(0) = 5]$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 12

```
dsolve([diff(y(x),x)+2*x*y(x)=0,y(0) = 5],y(x), singsol=all)
```

$$y(x) = 5e^{-x^2}$$

### ✓ Solution by Mathematica

Time used: 0.021 (sec). Leaf size: 14

```
DSolve[{y'[x]+2*x*y[x]==0,y[0]==5},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow 5e^{-x^2}$$

### 1.13 problem 13

Internal problem ID [2555]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 13.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$\cot(x)y' - y = 0$$

With initial conditions

$$[y(0) = 2]$$

#### ✓ Solution by Maple

Time used: 0.016 (sec). Leaf size: 8

```
dsolve([cot(x)*diff(y(x),x)=y(x),y(0) = 2],y(x), singsol=all)
```

$$y(x) = 2 \sec(x)$$

#### ✓ Solution by Mathematica

Time used: 0.038 (sec). Leaf size: 9

```
DSolve[{Cot[x]*y'[x]==y[x],y[0]==2},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow 2 \sec(x)$$



## 1.14 problem 14

Internal problem ID [2556]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 14.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y' - x e^{-2y} = 0$$

With initial conditions

$$[y(0) = 0]$$

### ✓ Solution by Maple

Time used: 0.063 (sec). Leaf size: 12

```
dsolve([diff(y(x),x)=x*exp(-2*y(x)),y(0) = 0],y(x), singsol=all)
```

$$y(x) = \frac{\ln(x^2 + 1)}{2}$$

### ✓ Solution by Mathematica

Time used: 0.311 (sec). Leaf size: 15

```
DSolve[{y'[x]==x*Exp[-2*y[x]],y[0]==0},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \frac{1}{2} \log(x^2 + 1)$$

## 1.15 problem 15

Internal problem ID [2557]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 15.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$-2yx + y' - 2x = 0$$

With initial conditions

$$[y(0) = 1]$$

### ✓ Solution by Maple

Time used: 0.015 (sec). Leaf size: 12

```
dsolve([diff(y(x),x)-2*x*y(x)=2*x,y(0) = 1],y(x), singsol=all)
```

$$y(x) = -1 + 2e^{x^2}$$

### ✓ Solution by Mathematica

Time used: 0.034 (sec). Leaf size: 14

```
DSolve[{y'[x]-2*x*y[x]==2*x,y[0]==1},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow 2e^{x^2} - 1$$

## 1.16 problem 16

Internal problem ID [2558]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 16.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y'x - yx - y = 0$$

With initial conditions

$$[y(1) = 1]$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 10

```
dsolve([x*diff(y(x),x)=x*y(x)+y(x),y(1) = 1],y(x), singsol=all)
```

$$y(x) = x e^{x-1}$$

### ✓ Solution by Mathematica

Time used: 0.026 (sec). Leaf size: 12

```
DSolve[{x*y'[x]==x*y[x]+y[x],y[1]==1},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow e^{x-1}x$$

## 1.17 problem 17

Internal problem ID [2559]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 17.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_quadrature]

$$(x^3 + 1)y' - 3x^2 \tan(x) = 0$$

With initial conditions

$$\left[ y(0) = \frac{\pi}{2} \right]$$

✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 36

```
dsolve([(1+x^3)*diff(y(x),x)=3*x^2*tan(x),y(0) = 1/2*Pi],y(x), singsol=all)
```

$$y(x) = 3 \left( \int_0^x \frac{\tan(z) z^2}{(z+1)(z^2-z+1)} dz \right) + \frac{\pi}{2}$$

✓ Solution by Mathematica

Time used: 8.292 (sec). Leaf size: 35

```
DSolve[{(1+x^3)*y'[x]==3*x^2*Tan[x],y[0]==Pi/2},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \int_0^x \frac{3K[1]^2 \tan(K[1])}{K[1]^3 + 1} dK[1] + \frac{\pi}{2}$$

## 1.18 problem 18

Internal problem ID [2560]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 18.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$x \cos(y) y' - 1 - \sin(y) = 0$$

With initial conditions

$$[y(1) = 0]$$

### ✓ Solution by Maple

Time used: 0.094 (sec). Leaf size: 8

```
dsolve([x*cos(y(x))*diff(y(x),x)=1+sin(y(x)),y(1) = 0],y(x), singsol=all)
```

$$y(x) = \arcsin(x - 1)$$

### ✓ Solution by Mathematica

Time used: 49.915 (sec). Leaf size: 53

```
DSolve[{x*Cos[y[x]]*y'[x]==1+Sin[y[x]],y[1]==0},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow -2 \arccos\left(\frac{1}{2}(\sqrt{2-x} + \sqrt{x})\right)$$

$$y(x) \rightarrow 2 \arccos\left(\frac{1}{2}(\sqrt{2-x} + \sqrt{x})\right)$$

## 1.19 problem 19

Internal problem ID [2561]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 19.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y'x - 2y(y - 1) = 0$$

With initial conditions

$$\left[ y\left(\frac{1}{2}\right) = 2 \right]$$

### ✓ Solution by Maple

Time used: 0.031 (sec). Leaf size: 15

```
dsolve([x*diff(y(x),x)=2*y(x)*(y(x)-1),y(1/2) = 2],y(x), singsol=all)
```

$$y(x) = -\frac{1}{2x^2 - 1}$$

### ✓ Solution by Mathematica

Time used: 0.304 (sec). Leaf size: 14

```
DSolve[{x*y'[x]==2*y[x]*(y[x]-1),y[1/2]==2},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \frac{1}{1 - 2x^2}$$

## 1.20 problem 20

Internal problem ID [2562]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 20.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$2y'x - 1 + y^2 = 0$$

With initial conditions

$$[y(1) = 0]$$

### ✓ Solution by Maple

Time used: 0.032 (sec). Leaf size: 13

```
dsolve([2*x*diff(y(x),x)=1-y(x)^2,y(1) = 0],y(x), singsol=all)
```

$$y(x) = \frac{x - 1}{x + 1}$$

### ✓ Solution by Mathematica

Time used: 0.432 (sec). Leaf size: 14

```
DSolve[{2*x*y'[x]==1-y[x]^2,y[1]==0},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \frac{x - 1}{x + 1}$$

## 1.21 problem 21

Internal problem ID [2563]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 21.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$(1 - x)y' - yx = 0$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 15

```
dsolve((1-x)*diff(y(x),x)=x*y(x),y(x), singsol=all)
```

$$y(x) = \frac{c_1 e^{-x}}{x - 1}$$

### ✓ Solution by Mathematica

Time used: 0.029 (sec). Leaf size: 23

```
DSolve[(1-x)*y'[x]==x*y[x],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \frac{c_1 e^{-x}}{x - 1}$$

$$y(x) \rightarrow 0$$



## 1.22 problem 22

Internal problem ID [2564]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 22.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$(x^2 - 1)y' - y(x^2 + 1) = 0$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 16

```
dsolve((x^2-1)*diff(y(x),x)=(x^2+1)*y(x),y(x), singsol=all)
```

$$y(x) = \frac{e^x(x-1)c_1}{x+1}$$

### ✓ Solution by Mathematica

Time used: 0.031 (sec). Leaf size: 25

```
DSolve[(x^2-1)*y'[x]==(x^2+1)*y[x],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow -\frac{c_1 e^x (x-1)}{x+1}$$

$$y(x) \rightarrow 0$$

## 1.23 problem 23

Internal problem ID [2565]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 23.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y' - e^x(1 + y^2) = 0$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 9

```
dsolve(diff(y(x),x)=exp(x)*(y(x)^2+1),y(x), singsol=all)
```

$$y(x) = \tan(e^x + c_1)$$

### ✓ Solution by Mathematica

Time used: 0.259 (sec). Leaf size: 26

```
DSolve[y'[x]==Exp[x]*(y[x]^2+1),y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \tan(e^x + c_1)$$

$$y(x) \rightarrow -i$$

$$y(x) \rightarrow i$$

## 1.24 problem 24

Internal problem ID [2566]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 24.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$y'e^y + 2x - 2e^y x = 0$$

### ✓ Solution by Maple

Time used: 0.016 (sec). Leaf size: 19

```
dsolve(exp(y(x))*diff(y(x),x)+2*x=2*x*exp(y(x)),y(x), singsol=all)
```

$$y(x) = -\ln\left(-\frac{1}{-1 + e^{x^2} c_1}\right)$$

### ✓ Solution by Mathematica

Time used: 1.973 (sec). Leaf size: 21

```
DSolve[Exp[y[x]]*y'[x]+2*x==2*x*Exp[y[x]],y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \log\left(1 + e^{x^2+c_1}\right)$$

$$y(x) \rightarrow 0$$

## 1.25 problem 25

Internal problem ID [2567]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 25.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$e^{2x}yy' + 2x = 0$$

With initial conditions

$$[y(0) = 1]$$

### ✓ Solution by Maple

Time used: 0.11 (sec). Leaf size: 16

```
dsolve([exp(2*x)*y(x)*diff(y(x),x)+2*x=0,y(0) = 1],y(x), singsol=all)
```

$$y(x) = \sqrt{(1 + 2x)e^{-2x}}$$

### ✓ Solution by Mathematica

Time used: 1.792 (sec). Leaf size: 20

```
DSolve[{Exp[2*x]*y[x]*y'[x]+2*x==0,y[0]==1},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \sqrt{e^{-2x}(2x + 1)}$$

## 1.26 problem 26

Internal problem ID [2568]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 26.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type [\_separable]

$$xyy' - \sqrt{y^2 - 9} = 0$$

With initial conditions

$$[y(e^4) = 5]$$

### ✓ Solution by Maple

Time used: 0.046 (sec). Leaf size: 12

```
dsolve([x*y(x)*diff(y(x),x)=sqrt(y(x)^2-9),y(exp(4)) = 5],y(x), singsol=all)
```

$$y(x) = \sqrt{9 + \ln(x)^2}$$

### ✓ Solution by Mathematica

Time used: 0.236 (sec). Leaf size: 32

```
DSolve[{x*y[x]*y'[x]==Sqrt[y[x]^2-9],y[Exp[4]]==5},y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow \sqrt{\log^2(x) + 9}$$

$$y(x) \rightarrow \sqrt{(\log(x) - 16) \log(x) + 73}$$

## 1.27 problem 27

Internal problem ID [2569]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 27.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type `[_homogeneous, 'class C', _exact, _rational, [_Abel, '2nd typ`

$$(y - 1 + x)y' - 1 - x + y = 0$$

### ✓ Solution by Maple

Time used: 0.094 (sec). Leaf size: 27

```
dsolve((x+y(x)-1)*diff(y(x),x)=(x-y(x)+1),y(x), singsol=all)
```

$$y(x) = 1 - \frac{c_1 x + \sqrt{2c_1^2 x^2 + 1}}{c_1}$$

### ✓ Solution by Mathematica

Time used: 0.126 (sec). Leaf size: 47

```
DSolve[(x+y[x]-1)*y'[x]==(x-y[x]+1),y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow -\sqrt{2x^2 + 1 + c_1} - x + 1$$

$$y(x) \rightarrow \sqrt{2x^2 + 1 + c_1} - x + 1$$

## 1.28 problem 28

Internal problem ID [2570]

**Book:** Advanced Mathematica, Book2, Perkin and Perkin, 1992

**Section:** Chapter 11.3, page 316

**Problem number:** 28.

**ODE order:** 1.

**ODE degree:** 1.

CAS Maple gives this as type `[_homogeneous, 'class A', _rational, _Bernoulli]`

$$xyy' - 2x^2 + y^2 = 0$$

### ✓ Solution by Maple

Time used: 0.0 (sec). Leaf size: 30

```
dsolve(x*y(x)*diff(y(x),x)=2*x^2-y(x)^2,y(x), singsol=all)
```

$$y(x) = \frac{\sqrt{x^4 + c_1}}{x}$$

$$y(x) = -\frac{\sqrt{x^4 + c_1}}{x}$$

### ✓ Solution by Mathematica

Time used: 0.186 (sec). Leaf size: 38

```
DSolve[x*y[x]*y'[x]==2*x^2-y[x]^2,y[x],x,IncludeSingularSolutions -> True]
```

$$y(x) \rightarrow -\frac{\sqrt{x^4 + c_1}}{x}$$

$$y(x) \rightarrow \frac{\sqrt{x^4 + c_1}}{x}$$